

Efficient Cesium in the RF Driven Surface-Plasma Negative Ion Source

Yuri Belchenko, Alexander Ivanov, Sergey Konstantinov, Andrey Sanin, Oleg Sotnikov

*Budker Institute of Nuclear Physics of Siberian Branch Russian Academy of Sciences, Novosibirsk,
Russia*

Corresponding Author: Yuri Belchenko, e-mail address: belchenko@inp.nsk.su

The decrease of plasma grid surface work function and the proper procedure of cesium seed to the large negative ion source are crucial for the neutral beam injectors of fusion devices. An external system of directed cesium delivery was tested in the large radio-frequency (RF) negative ion source, developed at BINP [1]. The system uses an external oven for cesium evaporation from the industrial pellets with cesium chromate and titanium, and the long distribution tubes to direct cesium onto the plasma grid. The plasma grid heating to temperature 120 – 250 oC facilitates the redistribution of deposited cesium over the plasma grid surface.

An efficient long-term cesiation of the plasma grid surface was obtained. The single cesium seed to the source has provided an enhanced level of H⁻ production during two month experimental cycle in spite of the night, weekend and accident stops. An additional boost of negative ion yield and the gradual source conditioning by RF discharge was recorded. The procedure of cesium seed, of cesium conditioning, and the data on long-time persistent operation with no additional cesium seed are discussed.

References

[1] Yu. Belchenko, A. Gorbovsky, A. Ivanov et al. "Negative ion production in the RF multiaperture surface-plasma source Multiaperture Negative Ion Source". AIP Conf. Proc. 1655, 040002 (2015).